

Inventor: **Vladimir M. Segal et al.**  
Serial No: **10/614,807**  
Filed: **July 9, 2003**  
For: **COPPER SPUTTERING  
TARGETS AND METHODS OF  
FORMING COPPER SPUTTERING  
TARGETS**

Examiner: **Harry D. Wilkins, III**  
Art Unit: **1795**

**MAIL STOP APPEAL BRIEF – PATENTS  
COMMISSIONER FOR PATENTS  
P.O. Box 1450  
ALEXANDRIA, VA 22313-1450**

**APPELLANT'S REPLY BRIEF UNDER 37 CFR § 41.41 IN RESPONSE TO THE  
EXAMINER'S ANSWER**

This reply brief follows the Examiner's Answer dated July 21, 2008. The reply brief was due Sunday, September 21, 2008, and therefore, this reply brief is timely filed on Monday, September 22, 2008. Any fees required under 37 CFR §1.17(f) are included with this brief. This brief contains the following items under the headings in the order here indicated:

**REPLY BRIEF UNDER 37 CFR § 41.41**

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### **REAL PARTY IN INTEREST**

The real party in interest is the assignee, Honeywell International Inc. (see Reel/Frame No. 014688/0759)

### **RELATED APPEALS AND INTERFERENCES**

There are no other appeals or interferences in this matter known to appellant.

### **STATUS OF THE CLAIMS ON APPEAL**

**Claims 16, 19-39 and 110 are on appeal in this case.**

There are 23 pending claims (claims 16, 19-39 and 110) in this case and all stand as rejected by the Examiner. Claims 16, 29 and 110 are pending independent claims. Claims 19-28 and 30-39 are the remaining pending dependent claims – dependent on claims 16 and 29, respectively.

Claims 16, 19, 29 and 110 were amended during prosecution. The remaining claims are all in their original form.

Claims 1-15, 17-18, 40-109 and 111 were previously canceled during prosecution.

### **STATUS OF AMENDMENTS**

There have been no amendments filed subsequent to final rejection in this matter.

**SUMMARY OF THE CLAIMED SUBJECT MATTER**

The subject matter of the present application is related to copper-comprising monolithic sputtering targets and copper-comprising bonded sputtering targets. Methods of producing these targets are also considered related to the subject matter of this application. Specifically, claims 16, 29 and 110 are the pending independent claims and read as follows:

Claim 16 recites:

“A copper alloy sputtering target consisting essentially of:

less than or equal to about 99.99% copper, by weight;

at least one alloying element selected from the group consisting of Cd, Ca, Au, Ag, Be, Li, Mg, Al, Pd, Hg, Ni, In, Zn, B, Ga, Mn, Sn, Ge, W, Cr, O, Sb, Ir, P, As, Co, Te, Fe, S, Ti, Zr, Sc, Si, Pt, Nb, Re, Mo, and Hf, a total amount of the at least one alloying element present in the target being at least 100 ppm and less than 10% by weight; the target having a hardness of at least 40 HB; and

an average grain size of less than 1 micron with a grain size uniformity standard deviation throughout the target of less than or equal to about 15% (I-sigma).”  
**(see paragraph [0034] on pages 9-10 and Figure 4, see paragraph [0030] on page 8, see paragraphs [0027] and [0028] on pages 7-8, and paragraph [0035] on page 10)**

Claim 29 recites:

“A copper alloy sputtering target consisting essentially of:

less than or equal to about 99.99% copper, by weight; and

at least one alloying element selected from the group consisting of Cd, Ca, Au, Ag, Be, Li, Mg, Al, Pd, Hg, Ni, In, Zn, B, Ga, Mn, Sn, Ge, W, Cr, O, Sb, Ir, P, As, Co, Te, Fe, S, Ti, Zr, Sc, Mo, Si, Re, Pt, Nb, and Hf, a total amount of the at least one alloying element present in the target being at least 100 ppm and less than 10%, by weight; the target having an average grain size of from 1 micron to about 20 micron, and having a grain size uniformity with a standard deviation of less than about 15% (1-sigma) throughout the target. “

**(see paragraph [0034] on pages 9-10 and Figure 4, see paragraph [0030] on page 8, see paragraphs [0027] and [0028] on pages 7-8, and paragraph [0035] on page 10)**

Claim 110 recites:

“A copper alloy sputtering target consisting essentially of:

less than or equal to about 99.99% copper, by weight; and

at least one alloying element selected from the group consisting of Cd, Ca, Au, Ag, Be, Li, In, B, Ga, Mn, Sn, Ge, W, Cr, O, Sb, Ir, P, As, Co, Te, S, Ti, Zr, Sc, Pt, Nb, Re, Mo, and Hf, a total amount of the at least one alloying element present in the target being at least 100 ppm and less than 10% by weight; the target having a hardness of at least 40 HB. “

**(see paragraph [0034] on pages 9-10 and Figure 4, see paragraph [0030] on page 8)**

The specification that supports those remaining independent claims is shown below:

Copper-comprising sputtering targets, particularly those that contain 99.99% copper by weight and has an average grain size of from 1 micron to 50 microns are contemplated. (see paragraph [0027] on page 7) Contemplated copper-comprising targets have a yield strength of greater than or equal to about 15 ksi and a Brinell hardness (HB) of greater than about 40. (see Figure 4, see paragraph [0030] on page 8)

Some contemplated copper alloy sputtering targets consist essentially of less than or equal to about 99.99% copper by weight and at least one alloying element selected from the group consisting of Cd, Ca, Au, Ag, Be, Li, Mg, Al, Pd, Hg, Ni, In, Zn, B, Ga, Mn, Sn, Ge, W, Cr, O, Sb, Ir, P, As, Co, Te, Fe, S, Ti, Zr, Sc, Si, Mo, Pt, Nb, Re and Hf. (see paragraph [0034] on pages 9-10) These targets have a total amount of alloying elements of at least 100 ppm and less than 10% by weight. (see paragraph [0034] on pages 9-10) These targets also have an average grain size of from 1 micron to 50 microns and a grain size uniformity having a standard deviation throughout the target of less than about 15% of 1-sigma. (see paragraphs [0027] and [0028] on pages 7-8, and paragraph [0035] on page 10)

Contemplated methods of forming monolithic sputtering targets comprises: a) providing a copper billet consisting essentially of copper and less than or equal to 10% by weight of a total amount of one or more alloying elements, which billet is heated to a temperature of at least about 900°F and maintained at that temperature for at least about 45 minutes, b) hot forging the billet with a reduction in height of at least about 50% to form a forged block and the block is cold rolled to a reduction of at least about 60% to form a blank, c) heating the blank to induce recrystallization and to form a fine grain distribution having an average grain size less than about 100 microns, and d) forming the blank into a monolithic target shape. (see Figure 1, paragraphs [0047]-[0052] on pages 15-18).

Additionally, methods are disclosed of forming a copper-comprising sputtering target from a copper-billet having a purity of at least 99.99% copper. (see paragraphs [0053]-[0064] on pages 18-23) The billet is hot forged at a temperature greater than 300°C with a reduction in height of at least 40% to form a forged block. (see paragraphs [0053]-[0064] on pages 18-23) The forged block is water quenched and subjected to an extrusion process comprising at least 4 passes of the forged block through equal channel angular extrusion (ECAE). (see Figure 3) An option solutionizing process can be conducted after the forging, followed by water quenching and the ECAE. (see paragraphs [0053]-[0064] on pages 18-23) Intermediate annealing is performed between at least some of the ECAE passes and, after completion of ECAE processing, the block is cold rolled to a reduction of less than 90% to form a blank. (see paragraphs [0053]-[0064] on pages 18-23) The blank can be heat treated and subsequently formed into a sputtering target. (see paragraphs [0053]-[0064] on pages 18-23)

**GROUND OF REJECTION TO BE REVIEWED ON APPEAL**

Claims 16 and 19-28 are rejected under 35 USC §103(a) as being unpatentable over Pavate et al. (US 6391163) in view of Perry et al. (US 6896748).

Claims 29-30 and 32-37 are rejected under 35 USC §103(a) as being unpatentable over Perry et al. (US 6896748).

Claims 31, 38 and 39 are rejected under 35 USC §103(a) as being unpatentable over Perry et al. (US 6896748) in view of Pavate et al. (US 6391163).

Claim 110 is rejected under 35 USC §103(a) as being unpatentable over Perry et al. (US 6896748) in view of Nagano et al (US 2001/0035238) and Pavate et al (US 6391163).

## **ARGUMENT**

### **ISSUE NO. 1 - §103(A) REJECTION OF CLAIMS 16 AND 19-28 BASED ON Pavate et al. (US 6391163) in view of Perry et al. (US 6896748)**

The Examiner cites Perry et al. (US 6896748) as a primary reference in the prosecution history of this case, and in this particular rejection as a secondary reference to apparently cure certain deficiencies in the Pavate reference. The Applicant respectfully considers Perry as a reference that is not relevant to the case at hand, primarily because the Perry reference was not filed prior to the effective filing date of the claims of the current application, which was December 16, 1999. The parent application, which is now US 6878250 filed on December 16, 1999, and one of the priority applications, US Provisional Application 60/396544, which was filed on June 16, 2002, both predate the filing date of the Perry reference – July 18, 2002.

The Examiner responded to this assertion by stating that the effective filing date of the claims is July 9, 2003, because the claims were not supported by the parent document – US 6878250 (“the ‘250 patent”). Unfortunately, the Examiner is incorrect. The Examiner uses Perry against the current claims **with respect to the grain size and the alloying elements**.

## **Grain Size**

The ‘250 patent discloses targets containing copper and copper alloys having a grain size of less than 1 micron with substantial absence of pores, voids, inclusions and other casting defects, while also having a substantially uniform structure and texture at any location (**see Summary of the Invention of the ‘250 patent**). Perry is not being cited with respect to the percentage of copper, and frankly, it wouldn’t be a proper



citation in that regard either, since the '250 patent clearly discloses high strength monolithic copper targets.

The Examiner uses the Perry reference in combination with Pavate et al. to show a method of forming copper alloy sputtering targets that achieve grain sizes as small as 0.1µm. (see 9-27-2006 Office Action, page 3). These grain sizes ("grain size less than about 1 micron" – see Column 2, line 51) are specifically taught in US 6878250, which is the parent disclosure to the present application. (please see the Summary of the Invention; Col. 5, lines 5-15; Col. 10, lines 23-47).

The Examiner also uses the Perry reference to teach that the process achieved a uniform microstructure throughout the target. (see 9-27-2006 Office Action, page 3). This uniform microstructure was also specifically taught throughout US 6878250, including Cols 11-12).

### **Alloying Elements**

The Examiner uses the Perry reference to teach a copper alloy sputtering target having alloying elements and a reduced grain size. (see 9-27-2006 Office Action, page 4). Alloying elements are taught in US 6878250 (see Column 4, lines 42-44: "High strength monolithic targets may be fabricated from mild materials like pure aluminum, copper, gold, platinum, nickel, titanium and their alloys").

The Examiner uses the Perry reference in combination with Pavate et al. to teach a copper alloy sputtering target having alloying elements of Mg, Zn or AL and a reduced grain size. (see 9-27-2006 Office Action, page 6). These alloying elements are taught in US 6878250 **and again in US Provisional Application 60/396544**, also filed before the Perry reference was filed.

The Examiner uses the Perry reference in combination with Pavate et al. and Nagano et al. to teach a copper alloy sputtering target having alloying elements and an increased hardness. (see 9-27-2006 Office Action, page 6). The deficiencies of the Perry reference are supplemented by the Nagano and Pavate references; however, the Perry reference didn't exist when the current disclosure was filed, and therefore, Nagano and Pavate cannot possibly supplement Perry. These embodiments are taught in US 6878250 and again in US Provisional Application 60/396544, also filed before the Perry reference was filed.

The Examiner finally rejects the previous arguments on the basis that Perry teaches that if the recrystallization temperature is too high that there is an undesired growth of grains. It has been shown that the US 6878250 and USSN 60/396544 applications predate the Perry filing date, and therefore, the reasons for the Examiner's continued rejections based on Perry are mooted.

### **Advisory Action**

In the Advisory Action dated January 22, 2008, the Examiner states that the "claims as a whole" are not supported in any previous application. Therefore, the present claims are granted an effective filing date of 9 July 2003." MPEP Section 706.02 states that **any claims** that are fully supported in a previous application can claim the priority date of that previous application. It appears as though the Examiner is stating that all of the claims or the "claims as a whole" must be supported in a previous application to get the benefit of the priority date.

MPEP Section 201.11 states:

## **A. Claiming the Benefit of Provisional Applications**

Under 35 U.S.C. 119(e), the written description and drawing(s) (if any) of the provisional application must adequately support and enable the subject matter claimed in the nonprovisional application that claims the benefit of the provisional application. In *New Railhead Mfg., L.L.C. v. Vermeer Mfg. Co.*, 298 F.3d 1290, 1294, 63 USPQ2d 1843, 1846 (Fed. Cir. 2002), the court held that for a nonprovisional application to be afforded the priority date of the provisional application, "the specification of the provisional must 'contain a written description of the invention and the manner and process of making and using it, in such full, clear, concise, and exact terms,' 35 U.S.C. § 112 ¶1, to enable an ordinarily skilled artisan to practice the invention claimed in the nonprovisional application."

In *New Railhead*, the patented drill bit was the subject of a commercial offer for sale. A provisional application was filed after the sale offer, but well within the one year grace period of 35 U.S.C. 102(b). A nonprovisional application, which issued as Patent No. 5,899,283, was filed within one year of the filing of the provisional application but more than one year after the sale offer. If the '283 patent was not afforded the priority date of the provisional application, the patent would be invalid under 35 U.S.C. 102(b) since it was filed more than one year after the commercial offer for sale. The court looked at claim 1 of the '283 patent which recites a bit body being angled with respect to the sonde housing. The court then reviewed the provisional application and concluded that nowhere in the provisional application is the bit body expressly described as "being angled with respect to the sonde housing" as recited in claim 1 of the '283 patent. The court held that the disclosure of the provisional application does not adequately support the invention claimed in the '283 patent as to the angle limitation and therefore, the '283 patent is not entitled to the filing date of the provisional application under 35 U.S.C. 119(e)(1) and the '283 patent is invalid under 35 U.S.C. 102(b).

A claim is not required in a provisional application. However, for a claim in a later filed nonprovisional application to be entitled to the benefit of the filing date of the provisional application, the written description and drawing(s) (if any) of the provisional application must adequately support and enable the subject matter of the claim in the later filed nonprovisional application. If a claim in the nonprovisional application is not adequately supported by the written description and drawing(s) (if any) of the provisional application (as in *New Railhead*), that claim in the nonprovisional application is not entitled to the benefit of the filing date of the provisional application. If the filing date of the earlier provisional application is necessary, for example, in the case of an interference or to overcome a reference, care must be taken to ensure that the disclosure filed as the provisional application adequately provides (1) a written description of the subject matter of the claim(s) at issue in the later filed nonprovisional application, and (2) an enabling disclosure to permit one of ordinary skill in the art to make and use the claimed invention in the later filed nonprovisional application without undue experimentation.

## **B. Claiming the Benefit of Nonprovisional Applications**

The disclosure of a continuation application must be the same as the disclosure of the prior-filed application. See MPEP § 201.07. The disclosure of a divisional application must be the same as the disclosure of the prior-filed application, or include at least that portion of the disclosure of the prior-filed application that is germane to the invention claimed in the divisional application. See MPEP § 201.06. The disclosure of a continuation or divisional application cannot include anything which would constitute new matter if inserted in the prior-filed application. A continuation-in-part application may include matter not disclosed in the prior-filed application. See MPEP § 201.08. Only the claims of the continuation-in-part application that are disclosed in the manner provided by the first paragraph of 35 U.S.C. 112 in the prior-filed application are entitled to the benefit of the filing date of the prior-filed application. If there is a continuous chain of copending nonprovisional applications, each copending application must disclose the claimed invention of the later-filed application in the manner provided by the first paragraph of 35 U.S.C. 112, in order for the later-filed application to be entitled to the benefit of the earliest filing date.

Under 35 U.S.C. 120, a claim in a U.S. application is entitled to the benefit of the filing date of an earlier filed U.S. application if the subject matter of the claim is disclosed in the manner provided by 35 U.S.C. 112, first paragraph, in the earlier filed application. See, e.g., *Tronzo v. Biomet, Inc.*, 156 F.3d 1154, 47 USPQ2d 1829 (Fed. Cir. 1998); *In re Scheiber*, 587 F.2d 59, 199 USPQ 782 (CCPA 1978). A claim in a subsequently filed application that relies on a combination of prior applications may not be entitled to the benefit of an earlier filing date under 35 U.S.C. 120 since 35 U.S.C. 120 requires that the earlier filed application contain a disclosure which complies with 35 U.S.C. 112, first paragraph for each claim in the subsequently filed application. *Studiengesellschaft Kohle m.b.H. v. Shell Oil Co.*, 112 F.3d 1561, 1564, 42 USPQ2d 1674, 1677 (Fed. Cir. 1997).

A claim in the later-filed application is not entitled to the benefit of the filing date of the prior-filed application if the disclosure of the prior-filed application does not enable one skilled in the art to "use" the claimed invention. See *In re Hafner*, 410 F.2d 1403, 1406, 161 USPQ 783, 786 (CCPA 1969) ("[T]o be entitled to the benefits provided by [35 U.S.C. 120], the invention disclosed in the "previously filed" application must be described therein in such a manner as to satisfy *all* the requirements of the first paragraph of [35 U.S.C.] 112, including that which requires the description to be sufficient to enable one skilled in the art to *use* the [invention].").

Any claim in a continuation-in-part application which is directed *solely* to subject matter adequately disclosed under 35 U.S.C. 112 in the parent nonprovisional application is entitled to the benefit of the filing date of the parent nonprovisional application. However, if a claim in a continuation-in-part application recites a feature which was not disclosed or adequately supported by a proper disclosure under 35 U.S.C. 112 in the parent nonprovisional application, but which was first introduced or adequately supported in the continuation-in-part application, such a claim is entitled only to the filing date of the continuation-in-part application; *In re Chu*,

66 F.3d 292, 36 USPQ2d 1089 (Fed. Cir. 1995); *Transco Products, Inc. v. Performance Contracting Inc.*, 38 F.3d 551, 32 USPQ2d 1077 (Fed. Cir. 1994); *In re Van Lagenhoven*, 458 F.2d 132, 136, 173 USPQ 426, 429 (CCPA 1972); and *Chromalloy American Corp. v. Alloy Surfaces Co., Inc.*, 339 F. Supp. 859, 874, 173 USPQ 295, 306 (D. Del. 1972).

By way of further illustration, if the claims of a continuation-in-part application which are only entitled to the continuation-in-part filing date "read on" published, publicly used or sold, or patented subject matter (e.g., as in a genus-species relationship) a rejection under 35 U.S.C. 102 would be proper. Cases of interest in this regard are as follows: *Mendenhall v. Cedarapids Inc.*, 5 F.3d 1557, 28 USPQ2d 1081 (Fed. Cir. 1993); *In re Lukach*, 442 F.2d 967, 169 USPQ 795 (CCPA 1971); *In re Hafner*, 410 F.2d 1403, 161 USPQ 783 (CCPA 1969); *In re Ruscetta*, 255 F.2d 687, 118 USPQ 101 (CCPA 1958); *In re Steenbock*, 83 F.2d 912, 30 USPQ 45 (CCPA 1936); and *Ex parte Hageman*, 179 USPQ 747 (Bd. App. 1971).

Section 706.02 of the MPEP states:

## **VI. < DETERMINING THE EFFECTIVE FILING DATE OF THE APPLICATION**

The effective filing date of a U.S. application may be determined as follows:

(B) If the application is a continuation-in-part of an earlier U.S. application or international application, any claims in the new application not supported by the specification and claims of the parent application have an effective filing date equal to the filing date of the new application. Any claims which are fully supported under 35 U.S.C. 112 by the earlier parent application have the effective filing date of that earlier parent application.

(D) If the application properly claims benefit under 35 U.S.C. 119(e) to a provisional application, the effective filing date is the filing date of the provisional application for any claims which are fully supported under the first paragraph of 35 U.S.C. 112 by the provisional application.

See MPEP § 1893.03(b) for determining the effective filing date of an application under 35 U.S.C. 371. See MPEP § 201.11(a) and § 1895 for additional information on determining the effective filing date of a continuation, divisional, or continuation-in-part of a PCT application designating the U.S. See also MPEP § 1895.01 and § 1896 which discuss differences between applications filed under 35 U.S.C. 111(a) and international applications that enter national stage under 35 U.S.C. 371.

These sections of the MPEP are critical in determining the proper consideration of the priority documents of this application – the provisional applications and prior utility application.

In response to this point, it would be wise to again review the independent claims of the present application:

16. (Previously Presented) A copper alloy sputtering target consisting essentially of:

less than or equal to about 99.99% copper, by weight; ***(supported in ‘250 patent – Background of the Invention)***

at least one alloying element selected from the group consisting of Cd, Ca, Au, Ag, Be, Li, Mg, Al, Pd, Hg, Ni, In, Zn, B, Ga, Mn, Sn, Ge, W, Cr, O, Sb, Ir, P, As, Co, Te, Fe, S, Ti, Zr, Sc, Si, Pt, Nb, Re, Mo, and Hf, a total amount of the at least one alloying element present in the target being at least 100 ppm and less than 10% by weight; the target having a hardness of at least 40 HB ***(hardness is inherent property based on specific material)***; and ***(“including alloys with these and or other elements” – ‘250 patent – Background of the Invention)***

an average grain size of less than 1 micron with a grain size uniformity standard deviation throughout the target of less than or equal to about 15% (I-sigma). ***(‘250 patent, column 5, lines 5-15, Column 10, lines 40-46, Column 11, lines 4-11).***

29. (Previously Presented) A copper alloy sputtering target consisting essentially of:

less than or equal to about 99.99% copper, by weight; ***(supported in ‘250 patent – Background of the Invention)*** and

at least one alloying element selected from the group consisting of Cd, Ca, Au, Ag, Be, Li, Mg, Al, Pd, Hg, Ni, In, Zn, B, Ga, Mn, Sn, Ge, W, Cr, O, Sb, Ir, P, As, Co, Te, Fe, S, Ti, Zr, Sc, Mo, Si, Re, Pt, Nb, and Hf, a total amount of the at least one alloying element present in the target being at least 100 ppm and less than 10%, by weight; the target having an average grain size of from 1 micron to about 20 micron, and having a grain size uniformity with a standard deviation of less than about 15% (1-sigma) throughout the target. ***(“including alloys with these and or other elements” – ‘250 patent – Background of the Invention) (‘250 patent, column 5, lines 5-15, Column 10, lines 40-46, Column 11, lines 4-11).***

110. (Previously Presented) A copper alloy sputtering target consisting essentially of:

less than or equal to about 99.99% copper, by weight; ***(supported in ‘250 patent – Background of the Invention)*** and

at least one alloying element selected from the group consisting of Cd, Ca, Au, Ag, Be, Li, In, B, Ga, Mn, Sn, Ge, W, Cr, O, Sb, Ir, P, As, Co, Te, S, Ti, Zr, Sc, Pt, Nb, Re, Mo, and Hf, a total amount of the at least one alloying element present in the target being at least 100 ppm and less than 10% by weight; the target having a hardness of at least 40 HB. ***(“including alloys with these and or other elements” – ‘250 patent – Background of the Invention) (hardness is inherent property based on specific material)***

These independent claims are independently supported by the ‘250 patent, which has a filing date in 1999. It is clear that if the ‘250 patent were not the parent patent application to the current continuation-in-part application, it would have been cited as a 103(a) reference for mentioning “alloying elements and other elements”.

Therefore, it appears logical that this reference in the '250 patent should be considered as adequate support for the current claims.

**ISSUE NO. 2 - §103(A) REJECTION OF CLAIMS 29-30 and 32-37 BASED ON Perry et al. (US 6896748)**

The Examiner cites Perry et al. (US 6896748) as a primary reference in the prosecution history of this case. The Applicant respectfully considers Perry as a reference that is not relevant to the case at hand, primarily because the Perry reference was not filed prior to the effective filing date of the claims of the current application, which was December 16, 1999. The parent application, which is now US 6878250 filed on December 16, 1999, and one of the priority applications, US Provisional Application 60/396544, which was filed on June 16, 2002, both predate the filing date of the Perry reference – July 18, 2002.

The Examiner responded to this assertion by stating that the effective filing date of the claims is July 9, 2003, because the claims were not supported by the parent document – US 6878250 (“the ‘250 patent”). Unfortunately, the Examiner is incorrect. The Examiner uses Perry against the current claims **with respect to the grain size and the alloying elements**.

**Grain Size**

The '250 patent discloses targets containing copper and copper alloys having a grain size of less than 1 micron with substantial absence of pores, voids, inclusions and other casting defects, while also having a substantially uniform structure and texture at



any location (**see Summary of the Invention of the '250 patent**). Perry is not being cited with respect to the percentage of copper, and frankly, it wouldn't be a proper citation in that regard either, since the '250 patent clearly discloses high strength monolithic copper targets.

The Examiner uses the Perry reference in combination with Pavate et al. to show a method of forming copper alloy sputtering targets that achieve grain sizes as small as 0.1µm. (see 9-27-2006 Office Action, page 3). These grain sizes ("grain size less than about 1 micron" – see Column 2, line 51) are specifically taught in US 6878250, which is the parent disclosure to the present application. (please see the Summary of the Invention; Col. 5, lines 5-15; Col. 10, lines 23-47).

The Examiner also uses the Perry reference to teach that the process achieved a uniform microstructure throughout the target. (see 9-27-2006 Office Action, page 3). This uniform microstructure was also specifically taught throughout US 6878250, including Cols 11-12).

### **Alloying Elements**

The Examiner uses the Perry reference to teach a copper alloy sputtering target having alloying elements and a reduced grain size. (see 9-27-2006 Office Action, page 4). Alloying elements are taught in US 6878250 (see Column 4, lines 42-44: "High strength monolithic targets may be fabricated from mild materials like pure aluminum, copper, gold, platinum, nickel, titanium and their alloys").

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taught in US 6878250 **and again in US Provisional Application 60/396544**, also filed before the Perry reference was filed.

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The Examiner finally rejects the previous arguments on the basis that Perry teaches that if the recrystallization temperature is too high that there is an undesired growth of grains. It has been shown that the US 6878250 and USSN 60/396544 applications predate the Perry filing date, and therefore, the reasons for the Examiner's continued rejections based on Perry are mooted.

### **Advisory Action**

In the Advisory Action dated January 22, 2008, the Examiner states that the "claims as a whole" are not supported in any previous application. Therefore, the present claims are granted an effective filing date of 9 July 2003." MPEP Section 706.02 states that **any claims** that are fully supported in a previous application can claim the priority date of that previous application. It appears as though the Examiner is stating that all of the claims or the "claims as a whole" must be supported in a previous application to get the benefit of the priority date.

In response to this point, it would be wise to again review the independent claims of the present application:

16. (Previously Presented) A copper alloy sputtering target consisting essentially of:

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at least one alloying element selected from the group consisting of Cd, Ca, Au, Ag, Be, Li, Mg, Al, Pd, Hg, Ni, In, Zn, B, Ga, Mn, Sn, Ge, W, Cr, O, Sb, Ir, P, As, Co, Te, Fe, S, Ti, Zr, Sc, Si, Pt, Nb, Re, Mo, and Hf, a total amount of the at least one alloying element present in the target being at least 100 ppm and less than 10% by weight; the target having a hardness of at least 40 HB **(hardness is inherent property based on specific material)**; and **(“including alloys with these and or other elements” – ‘250 patent – Background of the Invention)**

an average grain size of less than 1 micron with a grain size uniformity standard deviation throughout the target of less than or equal to about 15% (I-sigma). **(‘250 patent, column 5, lines 5-15, Column 10, lines 40-46, Column 11, lines 4-11).**

29. (Previously Presented) A copper alloy sputtering target consisting essentially of:

less than or equal to about 99.99% copper, by weight; **(supported in ‘250 patent – Background of the Invention)** and

at least one alloying element selected from the group consisting of Cd, Ca, Au, Ag, Be, Li, Mg, Al, Pd, Hg, Ni, In, Zn, B, Ga, Mn, Sn, Ge, W, Cr, O, Sb, Ir, P, As, Co, Te, Fe, S, Ti, Zr, Sc, Mo, Si, Re, Pt, Nb, and Hf, a total amount of the at least one alloying element present in the target being at least 100 ppm and less than

10%, by weight; the target having an average grain size of from 1 micron to about 20 micron, and having a grain size uniformity with a standard deviation of less than about 15% (1-sigma) throughout the target. (***“including alloys with these and or other elements” – ‘250 patent – Background of the Invention) (‘250 patent, column 5, lines 5-15, Column 10, lines 40-46, Column 11, lines 4-11).***

110. (Previously Presented) A copper alloy sputtering target consisting essentially of:

less than or equal to about 99.99% copper, by weight; (***supported in ‘250 patent – Background of the Invention)*** and

at least one alloying element selected from the group consisting of Cd, Ca, Au, Ag, Be, Li, In, B, Ga, Mn, Sn, Ge, W, Cr, O, Sb, Ir, P, As, Co, Te, S, Ti, Zr, Sc, Pt, Nb, Re, Mo, and Hf, a total amount of the at least one alloying element present in the target being at least 100 ppm and less than 10% by weight; the target having a hardness of at least 40 HB. (***“including alloys with these and or other elements” – ‘250 patent – Background of the Invention) (hardness is inherent property based on specific material)***

These independent claims are independently supported by the ‘250 patent, which has a filing date in 1999. It is clear that if the ‘250 patent were not the parent patent application to the current continuation-in-part application, it would have been cited as a 103(a) reference for mentioning “alloying elements and other elements”. Therefore, it appears logical that this reference in the ‘250 patent should be considered as adequate support for the current claims.

**ISSUE No. 3 - §103(A) REJECTION OF CLAIMS 31, 38 and 39 BASED ON Perry et al. (US 6896748) in view of Pavate**

The Examiner cites Perry et al. (US 6896748) as a primary reference in the prosecution history of this case. The Applicant respectfully considers Perry as a reference that is not relevant to the case at hand, primarily because the Perry reference was not filed prior to the effective filing date of the claims of the current application, which was December 16, 1999. The parent application, which is now US 6878250 filed on December 16, 1999, and one of the priority applications, US Provisional Application 60/396544, which was filed on June 16, 2002, both predate the filing date of the Perry reference – July 18, 2002.

The Examiner responded to this assertion by stating that the effective filing date of the claims is July 9, 2003, because the claims were not supported by the parent document – US 6878250 (“the ‘250 patent”). Unfortunately, the Examiner is incorrect. The Examiner uses Perry against the current claims **with respect to the grain size and the alloying elements**.

**Grain Size**

The ‘250 patent discloses targets containing copper and copper alloys having a grain size of less than 1 micron with substantial absence of pores, voids, inclusions and other casting defects, while also having a substantially uniform structure and texture at any location (**see Summary of the Invention of the ‘250 patent**). Perry is not being cited with respect to the percentage of copper, and frankly, it wouldn't be a proper citation in that regard either, since the ‘250 patent clearly discloses high strength monolithic copper targets.

The Examiner uses the Perry reference in combination with Pavate et al. to show a method of forming copper alloy sputtering targets that achieve grain sizes as small as 0.1µm. (see 9-27-2006 Office Action, page 3). These grain sizes ("grain size less than about 1 micron" – see Column 2, line 51) are specifically taught in US 6878250, which is the parent disclosure to the present application. (please see the Summary of the Invention; Col. 5, lines 5-15; Col. 10, lines 23-47).

The Examiner also uses the Perry reference to teach that the process achieved a uniform microstructure throughout the target. (see 9-27-2006 Office Action, page 3). This uniform microstructure was also specifically taught throughout US 6878250, including Cols 11-12).

### **Alloying Elements**

The Examiner uses the Perry reference to teach a copper alloy sputtering target having alloying elements and a reduced grain size. (see 9-27-2006 Office Action, page 4). Alloying elements are taught in US 6878250 (see Column 4, lines 42-44: "High strength monolithic targets may be fabricated from mild materials like pure aluminum, copper, gold, platinum, nickel, titanium and their alloys").

The Examiner uses the Perry reference in combination with Pavate et al. to teach a copper alloy sputtering target having alloying elements of Mg, Zn or AL and a reduced grain size. (see 9-27-2006 Office Action, page 6). These alloying elements are taught in US 6878250 **and again in US Provisional Application 60/396544**, also filed before the Perry reference was filed.

The Examiner uses the Perry reference in combination with Pavate et al. and Nagano et al. to teach a copper alloy sputtering target having alloying elements and an increased hardness. (see 9-27-2006 Office Action, page 6). The deficiencies of the

Perry reference are supplemented by the Nagano and Pavate references; however, the Perry reference didn't exist when the current disclosure was filed, and therefore, Nagano and Pavate cannot possibly supplement Perry. These embodiments are taught in US 6878250 and again in US Provisional Application 60/396544, also filed before the Perry reference was filed.

The Examiner finally rejects the previous arguments on the basis that Perry teaches that if the recrystallization temperature is too high that there is an undesired growth of grains. It has been shown that the US 6878250 and USSN 60/396544 applications predate the Perry filing date, and therefore, the reasons for the Examiner's continued rejections based on Perry are mooted.

### **Advisory Action**

In the Advisory Action dated January 22, 2008, the Examiner states that the "claims as a whole" are not supported in any previous application. Therefore, the present claims are granted an effective filing date of 9 July 2003." MPEP Section 706.02 states that **any claims** that are fully supported in a previous application can claim the priority date of that previous application. It appears as though the Examiner is stating that all of the claims or the "claims as a whole" must be supported in a previous application to get the benefit of the priority date.

In response to this point, it would be wise to again review the independent claims of the present application:

29. (Previously Presented) A copper alloy sputtering target consisting essentially of:  
less than or equal to about 99.99% copper, by weight; ***(supported in '250 patent – Background of the Invention)*** and

at least one alloying element selected from the group consisting of Cd, Ca, Au, Ag, Be, Li, Mg, Al, Pd, Hg, Ni, In, Zn, B, Ga, Mn, Sn, Ge, W, Cr, O, Sb, Ir, P, As, Co, Te, Fe, S, Ti, Zr, Sc, Mo, Si, Re, Pt, Nb, and Hf, a total amount of the at least one alloying element present in the target being at least 100 ppm and less than 10%, by weight; the target having an average grain size of from 1 micron to about 20 micron, and having a grain size uniformity with a standard deviation of less than about 15% (1-sigma) throughout the target. ***(“including alloys with these and or other elements” – ‘250 patent – Background of the Invention) (‘250 patent, column 5, lines 5-15, Column 10, lines 40-46, Column 11, lines 4-11).***

These independent claims are independently supported by the ‘250 patent, which has a filing date in 1999. It is clear that if the ‘250 patent were not the parent patent application to the current continuation-in-part application, it would have been cited as a 103(a) reference for mentioning “alloying elements and other elements”. Therefore, it appears logical that this reference in the ‘250 patent should be considered as adequate support for the current claims.



**ISSUE NO. 4 - §103(A) REJECTION OF CLAIM 110 BASED ON Perry et al. (US 6896748) in view of Nagano et al (US 2001/0035238) and Pavate et al (US 6391163)**

The Examiner cites Perry et al. (US 6896748) as a primary reference in the prosecution history of this case. The Applicant respectfully considers Perry as a reference that is not relevant to the case at hand, primarily because the Perry reference was not filed prior to the effective filing date of the claims of the current application, which was December 16, 1999. The parent application, which is now US 6878250 filed on December 16, 1999, and one of the priority applications, US Provisional Application 60/396544, which was filed on June 16, 2002, both predate the filing date of the Perry reference – July 18, 2002.

The Examiner responded to this assertion by stating that the effective filing date of the claims is July 9, 2003, because the claims were not supported by the parent document – US 6878250 (“the ‘250 patent”). Unfortunately, the Examiner is incorrect. The Examiner uses Perry against the current claims **with respect to the grain size and the alloying elements**.

**Grain Size**

The ‘250 patent discloses targets containing copper and copper alloys having a grain size of less than 1 micron with substantial absence of pores, voids, inclusions and other casting defects, while also having a substantially uniform structure and texture at any location (**see Summary of the Invention of the ‘250 patent**). Perry is not being cited with respect to the percentage of copper, and frankly, it wouldn’t be a proper citation in that regard either, since the ‘250 patent clearly discloses high strength monolithic copper targets.

The Examiner uses the Perry reference in combination with Pavate et al. to show a method of forming copper alloy sputtering targets that achieve grain sizes as small as 0.1µm. (see 9-27-2006 Office Action, page 3). These grain sizes ("grain size less than about 1 micron" – see Column 2, line 51) are specifically taught in US 6878250, which is the parent disclosure to the present application. (please see the Summary of the Invention; Col. 5, lines 5-15; Col. 10, lines 23-47).

The Examiner also uses the Perry reference to teach that the process achieved a uniform microstructure throughout the target. (see 9-27-2006 Office Action, page 3). This uniform microstructure was also specifically taught throughout US 6878250, including Cols 11-12).

### **Alloying Elements**

The Examiner uses the Perry reference to teach a copper alloy sputtering target having alloying elements and a reduced grain size. (see 9-27-2006 Office Action, page 4). Alloying elements are taught in US 6878250 (see Column 4, lines 42-44: "High strength monolithic targets may be fabricated from mild materials like pure aluminum, copper, gold, platinum, nickel, titanium and their alloys").

The Examiner uses the Perry reference in combination with Pavate et al. to teach a copper alloy sputtering target having alloying elements of Mg, Zn or AL and a reduced grain size. (see 9-27-2006 Office Action, page 6). These alloying elements are taught in US 6878250 **and again in US Provisional Application 60/396544**, also filed before the Perry reference was filed.

The Examiner uses the Perry reference in combination with Pavate et al. and Nagano et al. to teach a copper alloy sputtering target having alloying elements and an increased hardness. (see 9-27-2006 Office Action, page 6). The deficiencies of the

Perry reference are supplemented by the Nagano and Pavate references; however, the Perry reference didn't exist when the current disclosure was filed, and therefore, Nagano and Pavate cannot possibly supplement Perry. These embodiments are taught in US 6878250 and again in US Provisional Application 60/396544, also filed before the Perry reference was filed.

The Examiner finally rejects the previous arguments on the basis that Perry teaches that if the recrystallization temperature is too high that there is an undesired growth of grains. It has been shown that the US 6878250 and USSN 60/396544 applications predate the Perry filing date, and therefore, the reasons for the Examiner's continued rejections based on Perry are mooted.

#### **Advisory Action**

In the Advisory Action dated January 22, 2008, the Examiner states that the "claims as a whole" are not supported in any previous application. Therefore, the present claims are granted an effective filing date of 9 July 2003." MPEP Section 706.02 states that **any claims** that are fully supported in a previous application can claim the priority date of that previous application. It appears as though the Examiner is stating that all of the claims or the "claims as a whole" must be supported in a previous application to get the benefit of the priority date.

In response to this point, it would be wise to again review the independent claims of the present application:

110. (Previously Presented) A copper alloy sputtering target consisting essentially of:

less than or equal to about 99.99% copper, by weight; ***(supported in ‘250 patent – Background of the Invention)*** and  
at least one alloying element selected from the group consisting of Cd, Ca, Au, Ag, Be, Li, In, B, Ga, Mn, Sn, Ge, W, Cr, O, Sb, Ir, P, As, Co, Te, S, Ti, Zr, Sc, Pt, Nb, Re, Mo, and Hf, a total amount of the at least one alloying element present in the target being at least 100 ppm and less than 10% by weight; the target having a hardness of at least 40 HB. ***(“including alloys with these and other elements” – ‘250 patent – Background of the Invention) (hardness is inherent property based on specific material)***

These independent claims are independently supported by the ‘250 patent, which has a filing date in 1999. It is clear that if the ‘250 patent were not the parent patent application to the current continuation-in-part application, it would have been cited as a 103(a) reference for mentioning “alloying elements and other elements”. Therefore, it appears logical that this reference in the ‘250 patent should be considered as adequate support for the current claims.

**REQUEST FOR REVIEW OF POTENTIAL CLAIM AMENDMENTS, REQUEST TO REOPEN  
PROSECUTION AND CONCLUSION: REPLY TO THE EXAMINER'S RESPONSE**

The Examiner has used the Perry reference as the primary reference to either continue the first rejection of Pavate in view of Perry or to make the last three rejections. Therefore, the Examiner should reconsider this case without the knowledge of the Perry reference, since it was not in existence as of the earliest filing date of the first application.

The Applicant herein restates the arguments related to Pavate et al. as shown in the Request for Continued Examination. The Applicant also considers the application of the Nagano reference as mooted, since its a secondary reference to add to the teachings of Perry, which have been shown to postdate the current application's effective filing date(s).

The '250 patent recites that "prolonged sputtering target life" is a property of contemplated targets and materials. It is understood by one of ordinary skill in the art that prolonged sputtering target life is related to target density or target hardness. The Applicant contends that target hardness is an inherent property of the specific material after it is made and is not considered new matter.

The Applicant would consider removing the phrase "the target having a hardness of at least 40 HB" from the independent claims, if the Examiner considers this phrase outside of the scope of the parent '250 patent. It is the Applicant's contention that this provision is supported by the parent '250 patent by virtue of the fact that its a property that is inherent in the material, considering that the materials and processes in the '250 patent and the current application are the same. However, the Applicant would consider deleting it from the claims, if the Examiner agrees to reopen prosecution and reconsider this case.

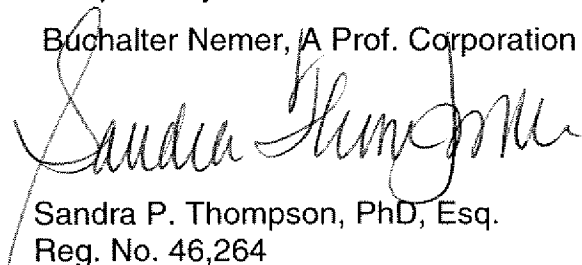
The Applicant also respectfully requests that this case be put in condition for allowance or that the Examiner contact the undersigned attorney of record at the number listed to discuss this case in full and any remaining rejections/issues, so that a full Appeal can be avoided. The Applicant additionally requests that in view of the information presented herein related to the Perry reference that the Examiner consider issuing another non-Final office action, if this case is not in condition for allowance, since any new action is not necessitated by amendments, but is instead based on a request for consideration.

Respectfully submitted,

Buchalter Nemer, A Prof. Corporation

Dated: September 22, 2008

By:



Sandra P. Thompson, PhD, Esq.

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## **APPENDIX OF PENDING CLAIMS**

Claims 1-15: Cancelled

16. (Previously Presented) A copper alloy sputtering target consisting essentially of:

less than or equal to about 99.99% copper, by weight;

at least one alloying element selected from the group consisting of Cd, Ca, Au, Ag, Be, Li, Mg, Al, Pd, Hg, Ni, In, Zn, B, Ga, Mn, Sn, Ge, W, Cr, O, Sb, Ir, P, As, Co, Te, Fe, S, Ti, Zr, Sc, Si, Pt, Nb, Re, Mo, and Hf, a total amount of the at least one alloying element present in the target being at least 100 ppm and less than 10% by weight; the target having a hardness of at least 40 HB; and

an average grain size of less than 1 micron with a grain size uniformity standard deviation throughout the target of less than or equal to about 15% (1-sigma).

Claims 17-18: Cancelled

19. (Previously Presented) The target of claim 16 having a grain size uniformity standard deviation throughout the target of less than or equal to about 10% (1-sigma).

20. (Original) The target of claim 16 having a hardness uniformity standard deviation of less than about 5% (1-sigma) throughout the target.

21. (Original) The target of claim 20 wherein the hardness uniformity standard deviation is less than about 3.5% (1-sigma).

22. (Original) The target of claim 16 wherein the target is monolithic.

23. (Original) The target of claim 16 is diffusion bonded to a backing plate, the diffusion bond having a bond yield strength of greater than about 15 ksi.

24. (Original) The target of claim 16 having an orientation distribution function (ODF) of less than about 15 times random.

25. (Original) The target of claim 16 having an orientation distribution function (ODF) of less than about 5 times random.
26. (Original) The target of claim 16 having a primary grain orientation other than (220).
27. (Original) The target of claim 16 wherein the at least one alloying element is selected from the group consisting of Ag, Al, In, Zn, B, Ga, Mg, Sn, Ge, Ti, and Zr.
28. (Original) The target of claim 16 wherein the total amount of alloying elements is from about 1000 ppm to less than about 2%.
29. (Previously Presented) A copper alloy sputtering target consisting essentially of:  
less than or equal to about 99.99% copper, by weight; and  
at least one alloying element selected from the group consisting of Cd, Ca, Au, Ag, Be, Li, Mg, Al, Pd, Hg, Ni, In, Zn, B, Ga, Mn, Sn, Ge, W, Cr, O, Sb, Ir, P, As, Co, Te, Fe, S, Ti, Zr, Sc, Mo, Si, Re, Pt, Nb, and Hf, a total amount of the at least one alloying element present in the target being at least 100 ppm and less than 10%, by weight; the target having an average grain size of from 1 micron to about 20 micron, and having a grain size uniformity with a standard deviation of less than about 15% (1-sigma) throughout the target.
30. (Original) The target of claim 29 wherein the grain size uniformity standard deviation is less than about 10% (1-sigma).
31. (Original) The target of claim 29 having a hardness of at least about 40 HB.
32. (Original) The target of claim 29 having a hardness uniformity comprising a hardness standard deviation of less than about 5% of 1-sigma throughout the target.
33. (Original) The target of claim 29 wherein the target is monolithic.



- 34. (Original) The target of claim 29 is diffusion bonded to a backing plate, the diffusion bond having a bond yield strength of greater than about 15 ksi.
- 35. (Original) The target of claim 29 having an orientation distribution function (ODF) of less than about 15 times random.
- 36. (Original) The target of claim 29 having an orientation distribution function (ODF) of less than about 5 times random.
- 37. (Original) The target of claim 29 having a primary grain orientation other than (220).
- 38. (Original) The target of claim 29 wherein the at least one alloying element is selected from the group consisting of Ag, Al, In, Zn, B, Ga, Mg, Sn, Ge, Ti, and Zr.
- 39. (Original) The target of claim 29 wherein the total amount of alloying elements is from about 1000 ppm to less than about 2%.

Claims 40-109: Cancelled

- 110. (Previously Presented) A copper alloy sputtering target consisting essentially of:

less than or equal to about 99.99% copper, by weight; and

at least one alloying element selected from the group consisting of Cd, Ca, Au, Ag, Be, Li, Pd, In, B, Ga, Mn, Sn, Ge, W, Cr, O, Sb, Ir, P, As, Co, Te, S, Ti, Zr, Sc, Pt, Nb, Re, Mo, and Hf, a total amount of the at least one alloying element present in the target being at least 100 ppm and less than 10% by weight; the target having a hardness of at least 40 HB.

- 111. Cancelled

#### **EVIDENCE APPENDIX**

There is no additional evidence at this time of which the Applicant's are aware.

#### **RELATED PROCEEDINGS APPENDIX**

There are no related proceedings at this time of which the Applicant's are aware.